

Name: _____ period: _____

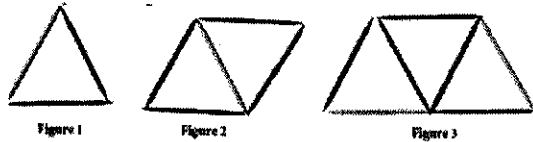
Toothpick Investigation

Step 1:

Make Figures 1 - 3 of the pattern.

How many toothpicks does it take to reproduce each figure?

How many toothpicks lie on the PERIMETER of each figure?



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Step 2:

Make Figures 4-6 from toothpicks by adding triangles in a row. Record the results in the table.

	Number of toothpicks	Perimeter
Figure 1		
Figure 2		
Figure 3		
Figure 4		
Figure 5		
Figure 6		
Figure 10		
Figure 25		

stop here!

Step 3:

What is the rule for finding the number of toothpicks in each figure? What is the rule for finding the perimeter? Use your calculator to create recursive routines for these rules. Check that these routines generate the numbers in your table.

Step 4:

Now make Figure 10 from toothpicks. Count the number of toothpicks and find the perimeter. Does your calculator routine give the same answers? Find the number of toothpicks and the perimeter for Figure 25. Add those results to the table.

Next you'll see what sequences you can generate with a new pattern.

Step 5 Design a pattern using a row of squares, instead of triangles, with your toothpicks. Repeat Steps 1–4 and answer all the questions with the new design. Record the results in the table.

	Number of toothpicks	Perimeter
Figure 1		
Figure 2		
Figure 3		
Figure 4		
Figure 5		
Figure 6		
Figure 10		
Figure 25		

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Step 6:

Choose a unit of measurement and explain how to calculate the area of a square made from toothpicks. How does your choice of unit affect calculations for the areas of each figure?

Now you'll create your own puzzle piece from toothpicks. Add identical pieces in one direction to make the succeeding figures of your design.

Step 7 Draw Figures 1–3 on your paper. Write recursive routines to generate number sequences for the number of toothpicks, perimeter, and area of each of six figures. Record these numbers in the table. Find the values for a figure made of ten puzzle pieces.

	Number of toothpicks	Perimeter	Area
Figure 1			
Figure 2			
Figure 3			
Figure 4			
Figure 5			
Figure 6			
Figure 10			

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Step 8 Write three questions about your pattern that require recursive sequences to answer. For example: What is the perimeter if the area is 20? Test your questions on your classmates.